

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2019/2020

TAC3121 – APPLIED CRYPTOGRAPHY

(All Sections / Groups)

18 OCTOBER 2019

3.00 p.m. – 5.00 p.m.

(2 Hours)

INSTRUCTIONS TO STUDENT

1. This Question paper consists of 3 pages with 5 Questions only.
2. Attempt **ALL** questions. All questions carry equal marks (10 marks) and the distribution of the marks for each question is given.
3. Please print all your answers in the Answer Booklet provided.

Question 1

- 1a) Describe the importance of providing data security with any **FOUR** examples. [4 marks]
- 1b) What is the difference between an unconditionally secure cipher and a computationally secure cipher? [4 marks]
- 1c) State the **TWO (2)** requirements for the secure use of symmetric encryption. [2 marks]

Question 2

- 2a) Perform the following operations using modulo reduction. [4 marks]
- i. $(4223 + 17323) \bmod 10$
ii. $(221 \times 23) \bmod 22$
- 2b) Using Euler's Totient function, find the value of [4 marks]
- i. $\phi(29)$ ii. $\phi(80)$
- 2c) Using the Rail Fence cipher of depth 2, decipher the following: [2 marks]

WAEONOUCEERBRTSCED

Question 3

- 3a) Identify the plaintext for the following ciphertext: [4 marks]

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Assume the usage of single stage keyed columnar transposition cipher and the decryption key as $(3 \ 1 \ 4 \ 2)$

- 3b) Given that Bob has public RSA key $e = 3$ and $p=11, q=3$. Compute Bob's private key d . [3 marks]
- 3c) State **ONE (1)** similarity and **TWO (2)** differences between a message authentication function (MAC) and a one-way hash function. [3 marks]

Continued...

Question 4

- 4a) Explain triple DES with two keys with a diagram. [2 marks]
- 4b) Explain **TWO (2)** advantages and **TWO (2)** security issues of Electronic Code Book (ECB) mode of operation. [4 marks]
- 4c) Explain the use of message authentication code (MAC) to provide both authentication and confidentiality when “*authentication is tied to plaintext*” with a diagram. [4 marks]

Question 5

- 5a) Explain **TWO (2)** types of attacks addressed by digital signature. [2 marks]
- 5b) Users A and B use the Diffie-Hellman key exchange technique with a common $q=71$ and a primitive root $a=7$. [4 marks]
- i. If user A has private key $X_A = 5$, what is A's public key Y_A ?
 - ii. If user B has private key $X_B = 12$, what is B's public key Y_B ?
 - iii. What is the shared secret key, K ?
- 5c) Describe **FOUR (4)** components of public-key certificates. [4 marks]

End of Paper